 997013

R & D CATALOG FORM

DATE: 6 January 1965

1. PROJECT TITLE/CODE NAME: Aspheric Lens Study (Expansion of Contract)

2. SHORT PROJECT DESCRIPTION: A study of ways to improve rear-projection lenses, the original contract considered aspherics; the new project expands this study to cover the use of lenses designed for highly monochromatic light.

3. CONTRACTOR NAME

25X1 [redacted]

4. LOCATION OF CONTRACTOR

5. CLASS OF CONTRACTOR: Univ.

6. TYPE OF CONTRACT: FP

7. FUNDS

25X1 FY 19 65 [redacted]

FY 19 $

FY 19 $

8. REQUISITION NO.: 5500-9688-63

9. BUDGET PROJECT NO.: NP-S-1

10. EFFECTIVE CONTRACT DATE (Begin - end): Sept. 1964 - 30 June 1966

11. SECURITY CLASS.
A. A. - Unclass. ✓
T - Unclass.
W - Unclass.

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION

25X1 DDI/NPIC/P&DS/ [redacted]

13. REQUIREMENT/AUTHORITY: This applied research is aimed at optimizing rear-projection viewers for use in the exploitation of photographic reconnaissance acquisitions.

14. TYPE OF WORK TO BE DONE

Applied research.

15. CATEGORIES OF EFFORT

| MAJOR CATEGORY | SUB-CATEGORIES |
|---|---|
| Special Techniques & Studies | a. Lens Systems<br>b. Optical Systems<br>c. Photogrammetry |

16. END ITEM OR SERVICES FROM THIS CONTRACT/IMPROVEMENT OVER CURRENT SYSTEM, EQUIPMENT, ETC.

The end item is a final report, a lens evaluation manual and the consulting

25X1 services of [redacted]

17. SUPPORTING OR RELATED CONTRACTS (Agency & Other)/COORDINATION

As a result of contacts throughout industry, the universities and the intelligence community, it appears that no equivalent research is underway.

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT (Continue on additional page if required)

25X1 On the 10th of June 1963, NPIC entered into contract number [redacted] This contract initiated investigation of the possibilities of optimizing the design of projection-type lenses through the use of aspheric surfaces. The fabrication of precision aspheric surfaces is an extremely difficult art; consequently, a concurrent study was undertaken to investigate the technology of aspherizing spherically-ground optical elements by means of thin-film evaporative techniques. However, there are additional problem areas which must be investigated preparatory to ultimate

19. APPROVED BY AND DATE

| OFFICE | DEPUTY DIRECTOR | DDCI |
|---|---|---|
| | | |

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18. Improvement of projection lenses for use in exploitation equipment. Toward this end, NPIC has considerable interest in lenses specifically designed for use with monochromatic light. This interest is a product of the fact that:

(1) A monochromatic lens system deals with a very narrow spectral band -- thereby eliminating the usual corrections for chromatic aberration. This reduces the complexity of the lens design and eliminates components that are common sources of third- and fifth- order aberrations. There is considerable evidence indicating that a high intensity, narrow band light can be used in projection-type instruments to produce an image of very high resolution. This improvement can be achieved through optimizing design of conventional and zoom-type projection lenses for monochromatic light.

(2) Our search for ultra-high resolution screens and research into image intensifiers has led, in turn, to extensive investigation of non-scattering phosphor types. The screens which appear most promising are activated by monochromatic light in the ultra-violet and infrared regions. It is obvious that research must be performed to develop the lenses necessary for these systems.

Furthermore, these investigations into advanced projection systems have indicated an operational requirement for some general guidance and counsel on problems in the area of high-resolution projection-type optics. The required guidance should be in the form of a projection lens testing manual with detailed description of what to look for in optimum projection lenses. Also, counsel should be available in the form of the services of [redacted] as a technical consultant. 25X1 25X1

Technical Specifications

25X1 The present contract [redacted] will be ammended to include the following items:

1. A study of ways to improve the performance of projection lenses by using a narrow spectral region as a source of light. Primary interest is in the ultra-violet and infrared portions of the spectrum. The study will include an analysis of the gain to be expected from designing zoom lenses for a restricted spectral region.

2. Preparation of a lens evaluation manual for projection lenses. The report will include descriptions of nearly optimum projection lenses and will indicate the type of performance one should be able to expect. The lens performance data would include: spot diagrams, energy distribution and frequency response curves.

25X1 3. The services of [redacted] as a consultant, including:

a. A trip to the International Committee on Optics meeting in Tokyo, Japan. We are funding only one-half the round-trip plane fare (tourist rate). 25X1 [redacted] will assume the remainder.

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18. b. A written report on optical activity reported at the ICO meeting.

c. A personal briefing on the current "state-of-the-art" in Japanese optics.

d. Occasional one-day visits to NPIC to discuss operational optical problems.

Approved For Release 2005/11/21 : CIA-RDP78B04770A001500060011-9

# Research and Development Project Approval Request

## I. Identification

The Development Branch of the Plans and Development Staff proposes a change in scope of contract number [redacted] 25X1
25X1 [redacted] titled, "Aspheric Lens Studies". This change incorporates an expansion of the project scope and one year extension of the contract
25X1 period. The effort is at the [redacted] level and is programmed for Fiscal Year 1965.

## II. Objectives

In addition to studies involving the design and fabrication (through evaporative techniques) of aspheric optical elements, it is intended to extend the scope of the current contract to include: (1) a study of improvements in performance that could be obtained through using projection lenses designed for use with highly monochromatic light (with the major emphasis on the UV and IR portions of the spectro), (2) preparation of a lens evaluation manual which will include descriptions of nearly optimum projection lenses,
25X1 and (3) the services of [redacted] as an optical consultant.

## III. Background

On the 10th of June 1963 NPIC entered into [redacted] with 25X1
25X1 the [redacted] This contract initiates investigation of the possibilities of optimization of the design of projection type lenses through the use of aspheric surfaces. The fabrication of precision aspheric surfaces is an extremely difficult art; consequently, a concurrent study was undertaken to investigate the technology of aspherizing spherically ground optical elements through thin film evaporative techniques. However, there are additional problem areas which must be investigated toward the ultimate improvement of projection lenses for use in exploitation equipment. Toward this end, NPIC has considerable interest in lenses specifically designed for use with monochromatic light. This interest results from the fact that (1) a monochromatic lens system deals with a very narrow spectral band thereby eliminating the usual corrections for chromatic aberation. This reduces the complexity of the lens design and eliminates components that are common sources of third and fifth order aberations.

As a consequence, there is considerable evidence to indicate that a high intensity, narrow band light can be used in projection type instruments to produce an image of very high-resolution through optimization of conventional and zoom type projection lens design for monochromatic light. (2) Our search for ultra-high resolution screens.

and research into image intensifiers has led to extensive investigation of non-scattering phosphor types. The screens which appear promising are activated by monochromatic light in the ultra-violet and infrared regions. Therefore, it is obvious that research must be performed to develop the lenses necessary for these systems. Furthermore, these investigations into advanced projection systems have indicated an operational requirement for some general guidance and counsel on problems in the area of high-resolution projection type optics. The required guidance should be in the form of a projection lens testing manual with detailed descriptions of what to look for in optimum projection lenses along with counsel in the form of the services of

25X1
25X1

[redacted] as a technical consultant.

IV. Technical Specifications

It is proposed to extend the present contract number [redacted] to include the following items: 25X1

1. To study ways of improving the performance of projection lenses by using a narrow spectral region as a source of light. The primary interest is in the ultra-violet and infrared portions of the spectrum. The study will include an analysis of the gain to be expected from designing zoom lenses using a restricted spectral region.

2. To prepare a lens evaluation manual for projection lenses. The report will include descriptions of nearly optimum projection lenses and indicate the type of performance one should be able to expect. The lens performance data would include: spot diagrams, energy distribution and frequency response curves.

3. To act in a consulting capacity to NPIC. These services would include:

a. A trip to the International Committee on Optics meeting in Tokyo, Japan. We are funding only one half the round trip plane fare (tourist rate).

b. A written report on optical activity reported at the ICO meeting.

c. A personal briefing on the current "state-of-the-art" on Japanese Optics.

d. Occassional one day visits to NPIC to discuss operational optical problems.

V. Contractor and Financial Arrangements

1. This change of scope would be accomplished under an adjunct to contract [redacted] at a total additional cost of [redacted] 25X1 25X1

2. To accommodate the additional projects, the contract period would be extended by one year.

VI. Security

This contract is to be handled under the [redacted] security already in effect on [redacted]. [redacted] already has the necessary clearances required for his consultant capacity. 25X1 25X1